# Ambient Levels of Radio Frequency Emissions in the Kingdom of Bahrain

Results of measurements made between

April and June 2011

A Report issued by the

Telecommunications Regulatory Authority

Reference: LIC/0711/319

03 July 2011

**Purpose**

This report presents the results of RF field strength measurements taken in the Kingdom of Bahrain during the 2nd Quarter of 2011.

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# 1 Executive Summary

1.1 This report is the 2nd report issued in 2011 by TRA as part of its ongoing campaign to measure the ambient level of Radio Frequency (RF) field strengths in the Kingdom of Bahrain.

1.2 Previous reports provided a detailed background to the issue as well as the results of measurements taken during the period covered by the report. This report provides the results of measurements made between April and June 2011 and can be considered to be an extension of the earlier reports.

1.3 The key findings concerning the measurements presented in this report are:

a. All RF field strengths measured are significantly below the ICNIRP guideline.

b. The highest total exposure levels for typical public sites measured during the quarter was 0.01% & 0.02 of the ICNIRP level. These levels were recorded at Hamad Town & Jid Ali as shown in figures 2 and 8 respectively.

c. The measurements using Insite Free equipment at Karbabad Rd 3423 & Jaw Primary School are higher than at other locations but this is to be expected given that the measurements were taken, in open air, at a distance of about 200m from the base station. Never the less, the measurements are still very small at just 0.04% & 0.016 of the ICNIRP level.

# 2 Introduction

2.1 This report is the 2nd report issued in 2011 by TRA as part of its ongoing campaign to measure the ambient level of Radio Frequency (RF) field strengths in the Kingdom of Bahrain.

2.2 Previous reports provided a detailed background to the issue as well as the results of measurements taken during the period covered by the report. This report provides the results of measurements made between April and June 2011 and can be considered to be an extension of the earlier reports.

2.3 During the period April to June 2011 measurements of RF field strengths were made at 12 locations throughout the Kingdom of Bahrain.

2.4 The results of these measurements are presented in section 4 of this report.

# 3 Scope

3.1 This report presents the results of measurements made between April and June 2011 at the following locations:

| Location | General Area | Specific location |
|---|---|---|
| 1 | Durrat Bahrain | near Al Osra Market |
| 2 | Jaw Primary School | Near Batelco Telecom Tower |
| 3 | Jufair | Blue Tower, block 340 |
| 4 | Hamad Town | Rd 1102 |
| 5 | Hoora | Rd 1812 |
| 6 | Janahbeya | Rd 7905 |
| 7 | Seef District | TRA office |
| 8 | Duraz | RD 4225 |
| 9 | Hamad town | Rd 444 |
| 10 | Jid Ali | Rd 2165 |
| 11 | Karbabad | Rd 3423 |
| 12 | Shahrakan | RD 4441 |

**Table 1: locations of measurement**

# 4 Results

4.1 Measurements were made either with the Insite Free or Insite Box systems. The Insite Box system enables automated measurements to be made continuously over a period of time (i.e. 24 hours a day and 7 days a week), but can only measure up to 3 GHz. The Insite Free equipment can measure up to 6GHz and therefore also measures the WiMAX band. Further, it enables a more detailed investigation of any frequency band within its range, but has to be operated manually. Thus the Insite Free system is used to measure signals in the WiMAX band and also for detailed follow-up investigations of measurements made using the Insite Box equipment.

**Insite Free**

4.2 Measurements using the Insite Free equipment were made at the sites listed in Table 2 below. These sites were selected as they are close to recently erected base stations.

4.3 The following table shows the total exposure measured at each location as a percentage of the ICNIRP level:

| Location / site name | Total % exposure limit |
|---|---|
| Durrat Bahrain | 0.0017 |
| Jaw Primary School | 0.016 |
| Karbabad | 0.040 |

**Table 2: Locations and results of measurement made with Insite Free**

**Insite Box**

4.4 Figures 1 to 9 below present the results of measurements taken at each site showing the total exposure as a fraction of the ICNIRP level, as well as the minimum, maximum and average field strengths measured, per band, as a percentage of the ICNIRP level.

4.5 All measurements were taken in typical public or domestic locations (i.e. inside homes, offices or apartments).

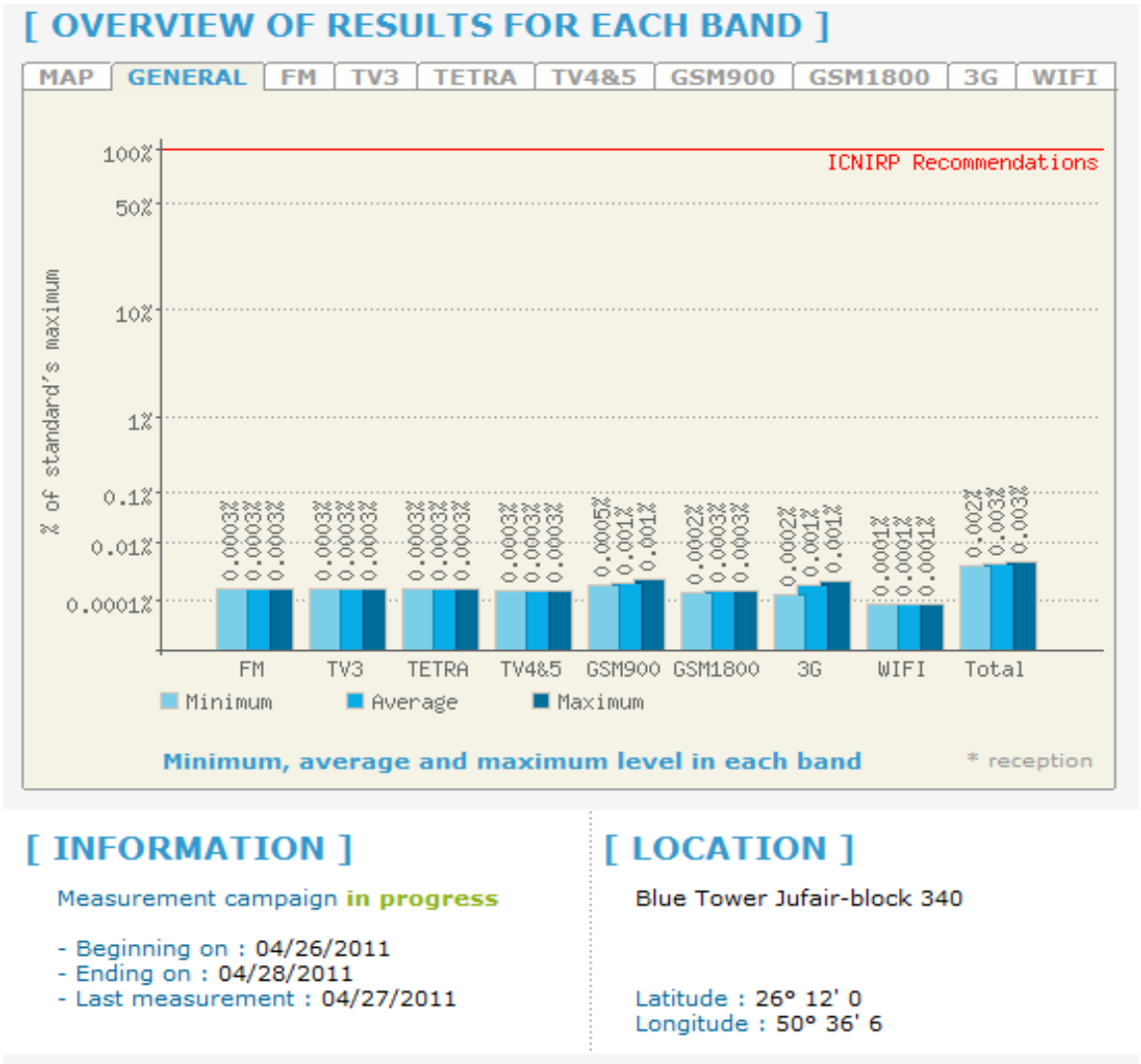


**Figure 1: Result for Jufair, Blue Tower, Block 340**

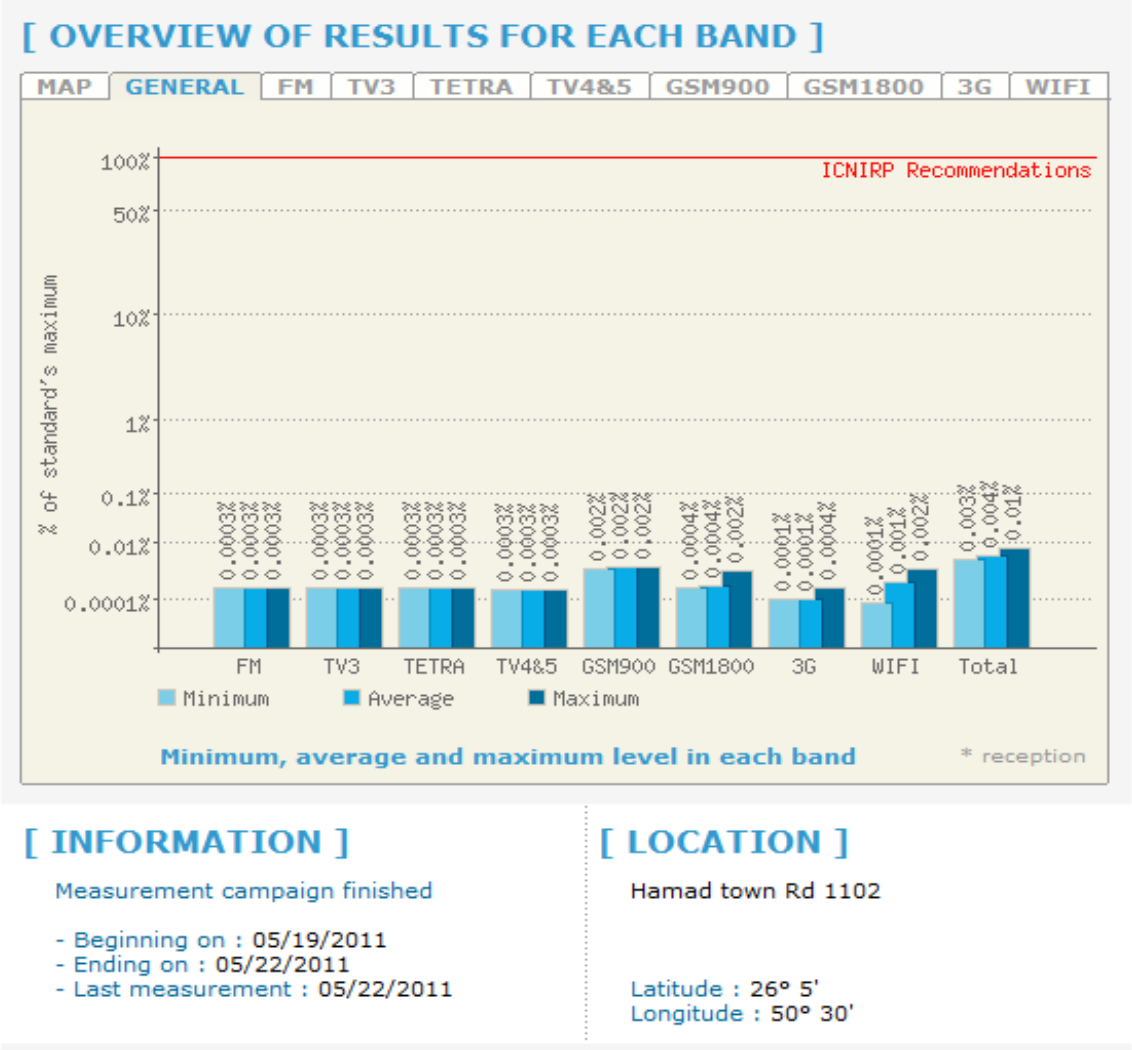


**Figure 2: Result for Hamad Town Rd 1102**

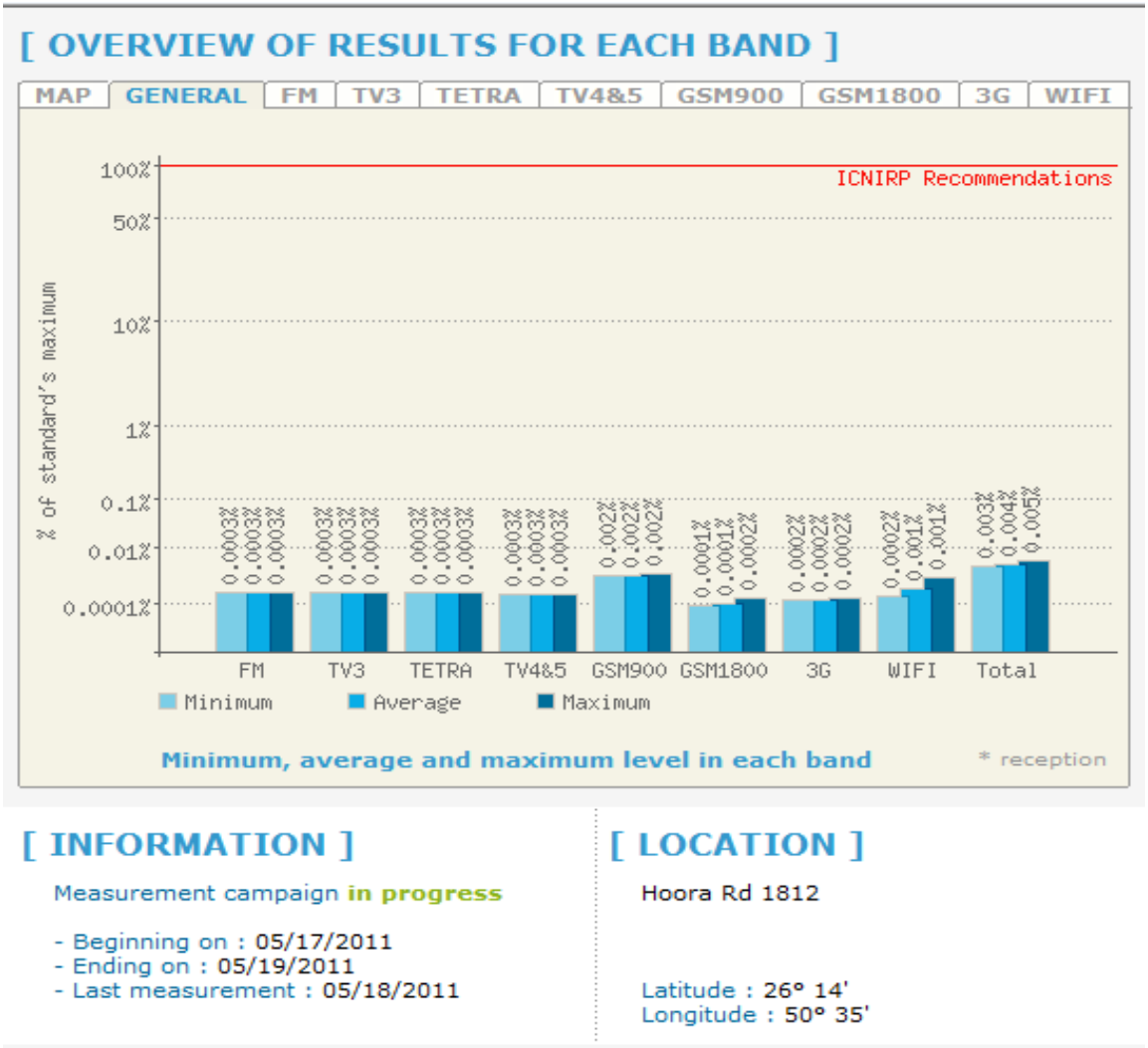


**Figure 3: Result for Hoora Rd 1812**

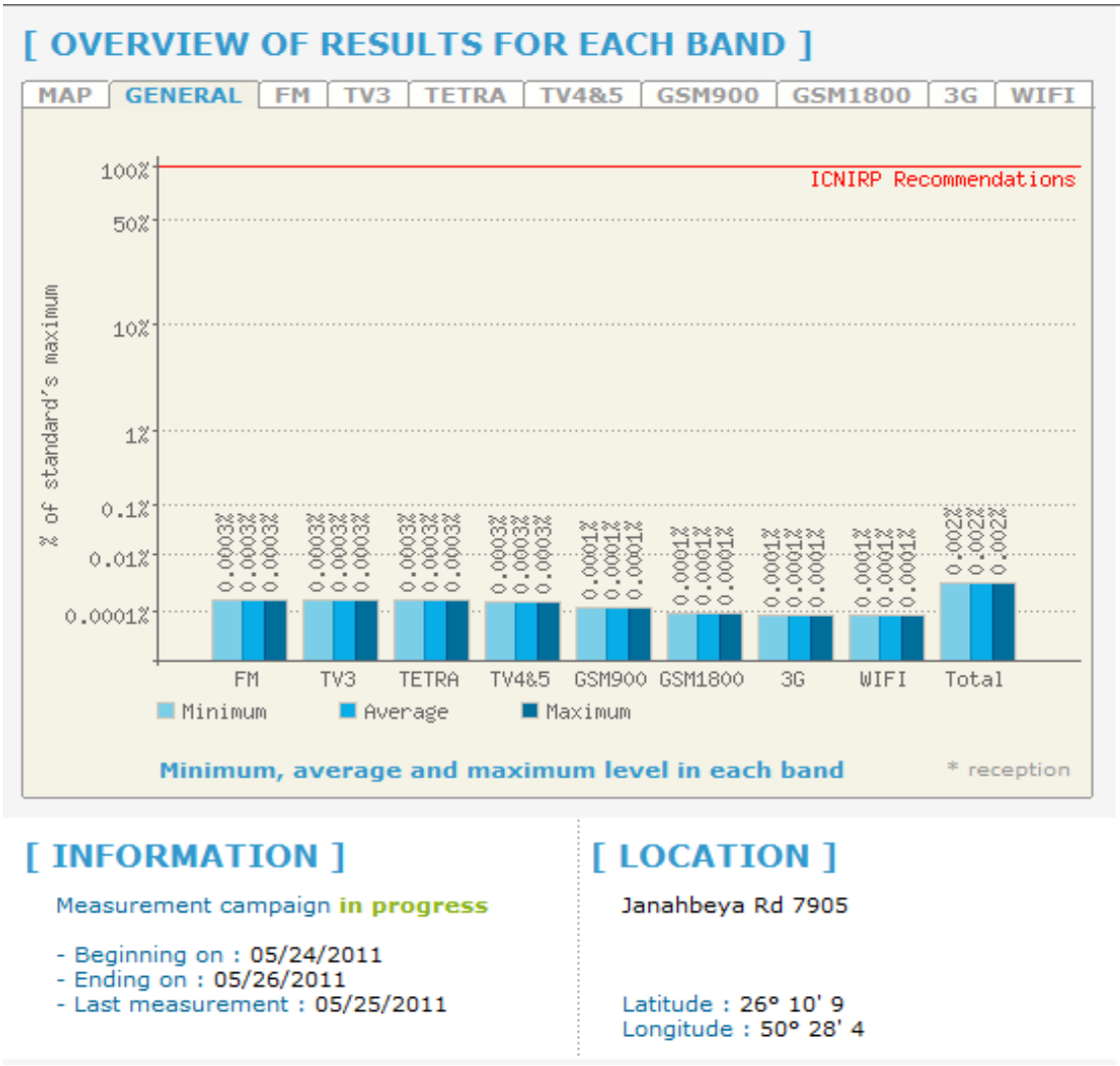


**Figure 4: Result for Janahbeya Rd 7905**

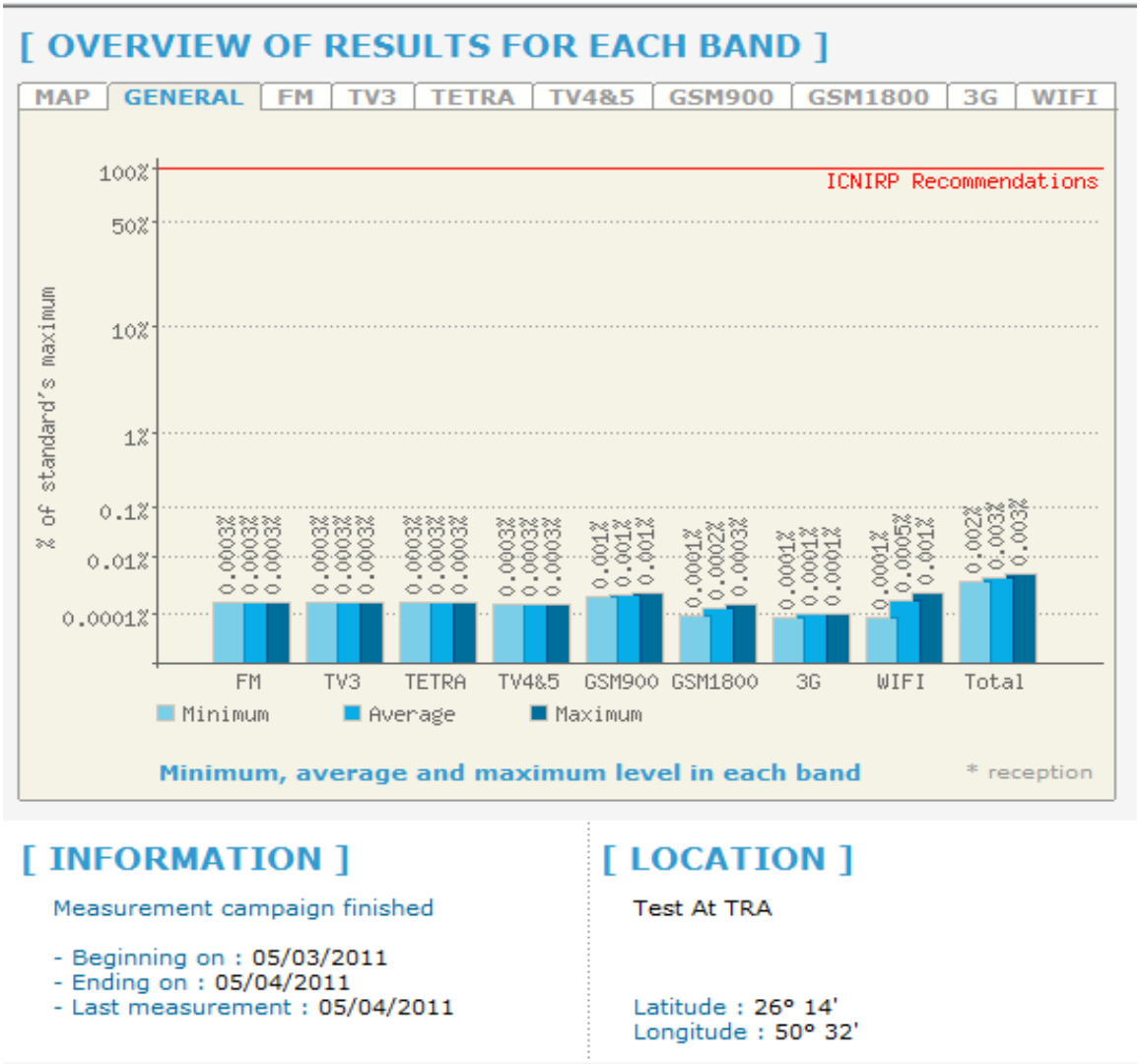


**Figure 5: Result for TRA Office, Seef District**

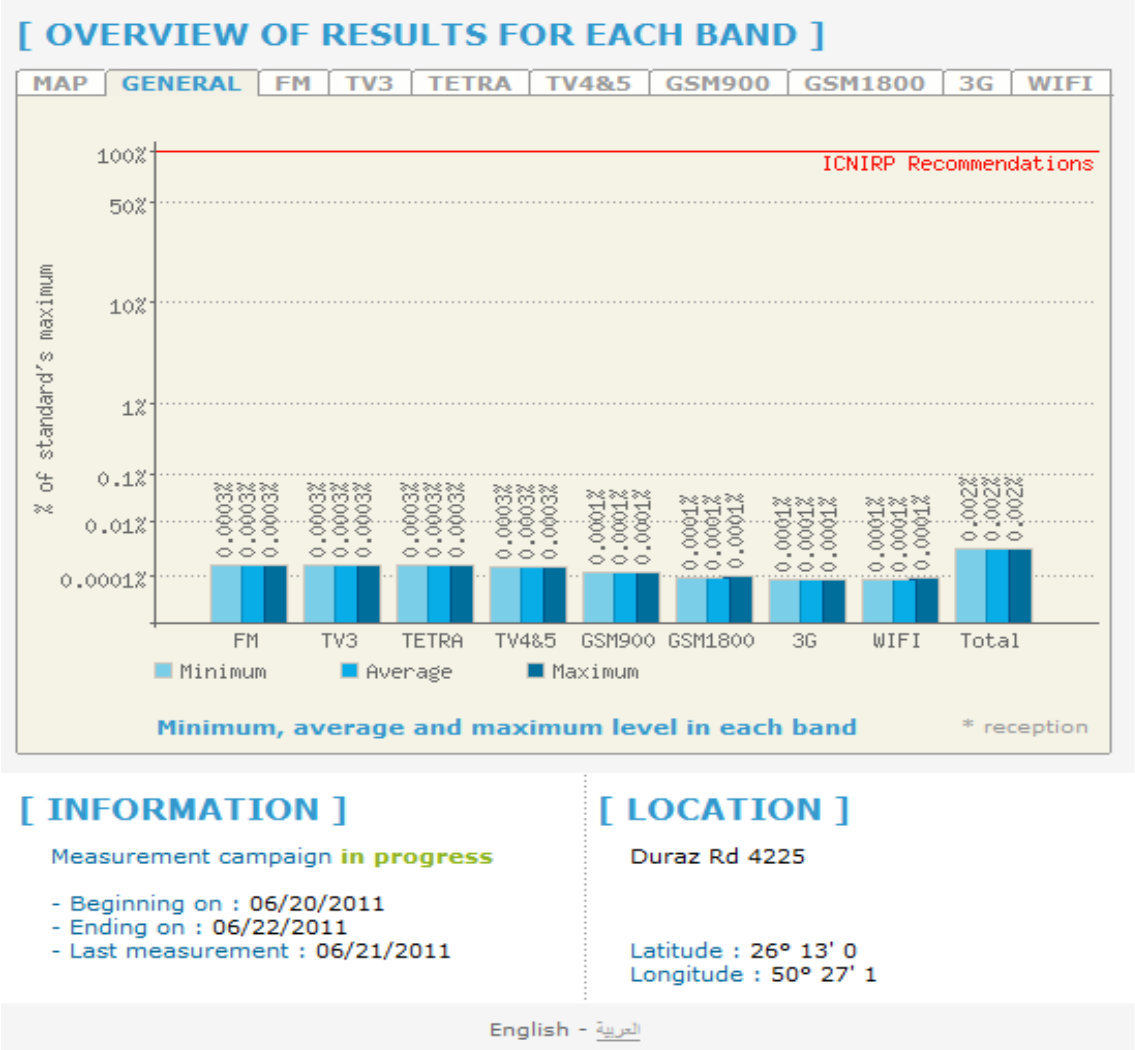


**Figure 6: Result for Duraz Rd 4225**

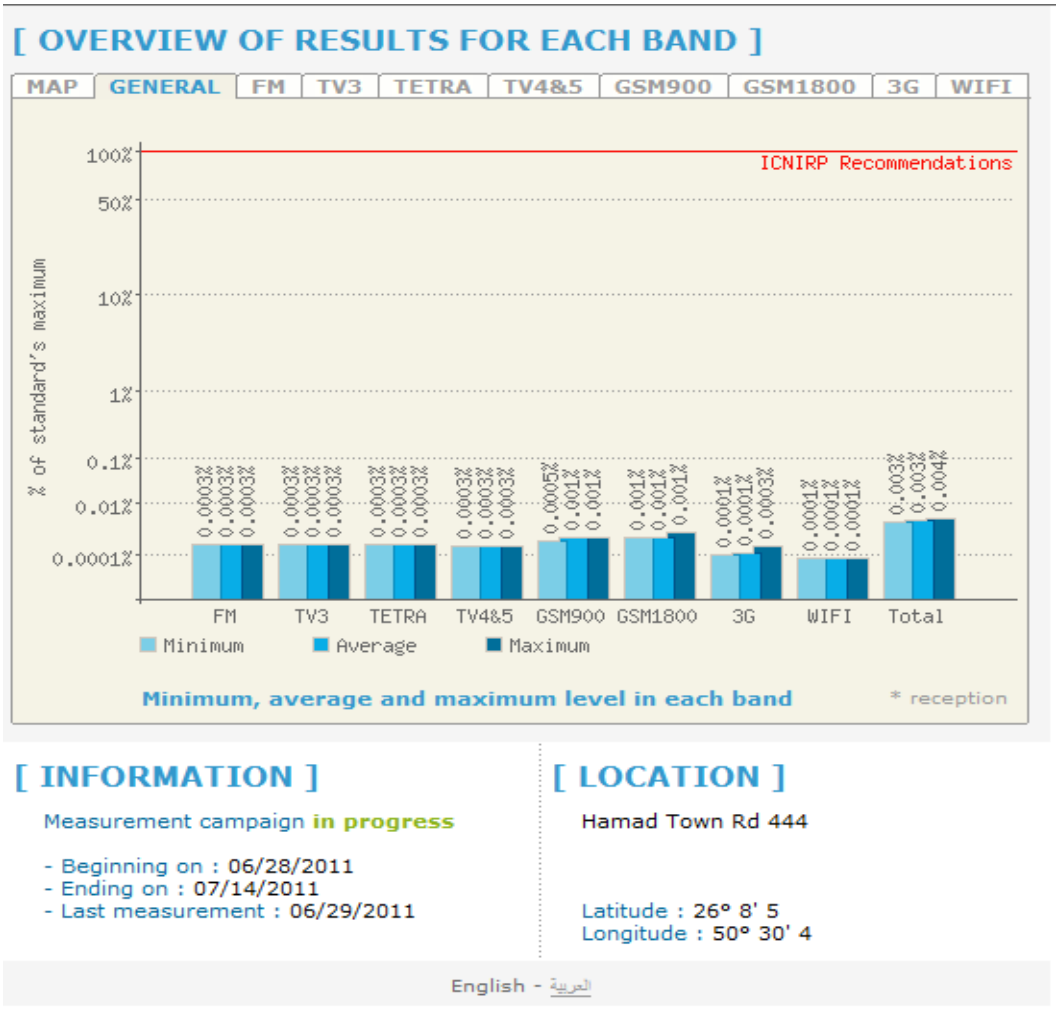


**Figure 7: Result for Hamad Town Rd 444**

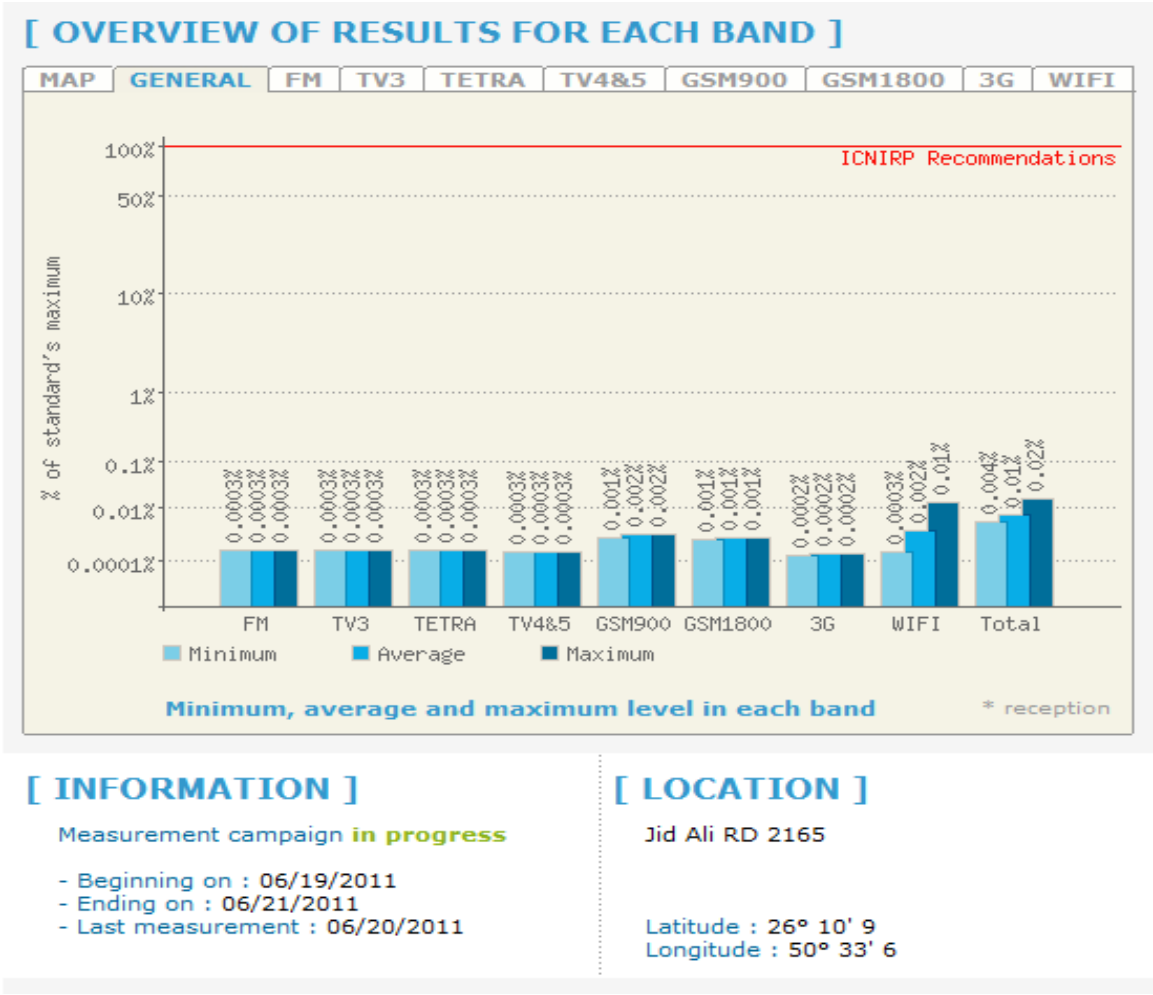


**Figure 8: Result for Jid Ali Rd 2165**

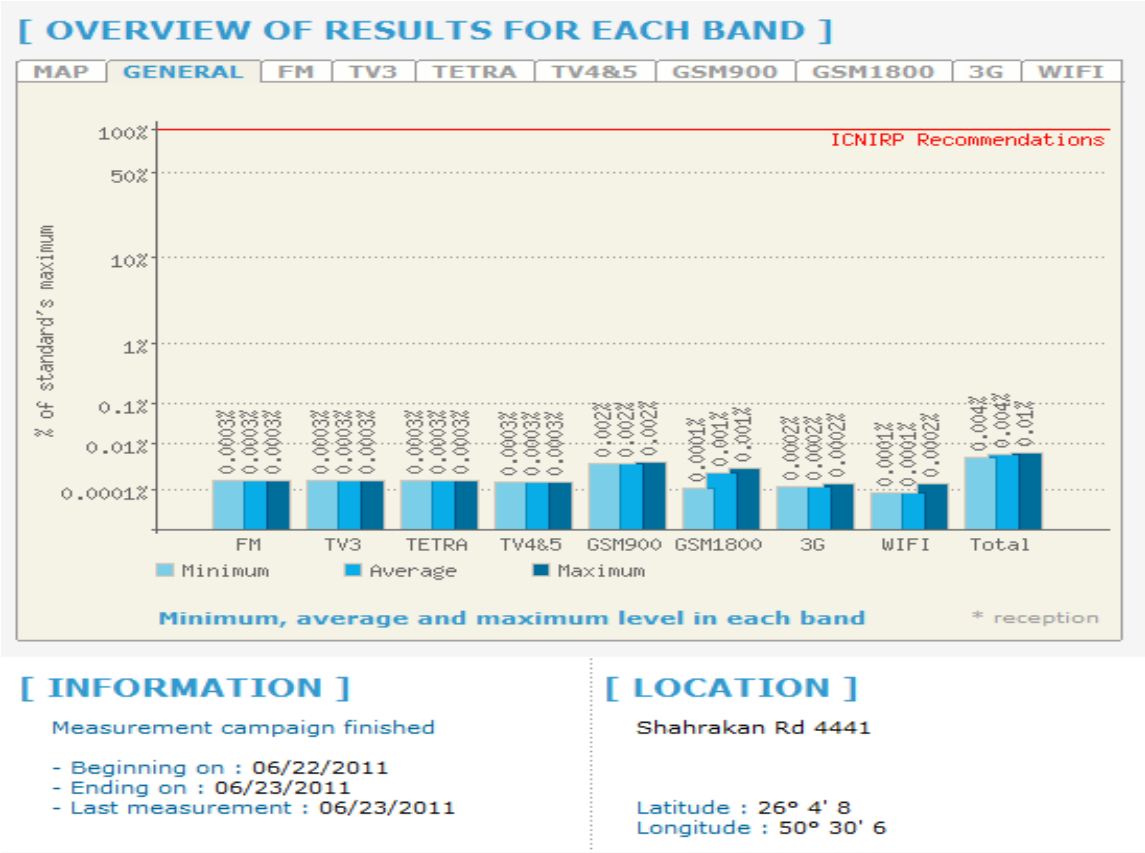


**Figure 9: Result for Shahrakan Rd 4441**

# 5 Conclusions

5.1 The levels of all RF signals measured during the period were very small compared to the ICNIRP guidelines and at, or very close to, the lowest signal level measureable by the test equipment.

5.2 The highest total exposure levels for typical public sites measured during the quarter were 0.01% & 0.02% of the ICNIRP level as shown in figures 2 and 8.

5.3 The measurements using Insite Free equipment at Karbabad & Jaw Primary School are higher than at other locations but this is to be expected given that the measurements were taken, in open air, at a distance of about 200m from the base station. Never the less, the measurements are still very small at just 0.04% & 0.016 of the ICNIRP level.

# 6 Next Steps

6.1 TRA will continue with the measurement campaign in 2011 to map RF signal levels throughout the Kingdom of Bahrain